PROC. BIOL. SOC. WASH.
101(4), 1988, pp. 959–965

STUDIES IN THE *LEPIDAPLOA* COMPLEX (VERNONIEAE: ASTERACEAE) VI. A NEW GENUS, *AYNIA*

Harold Robinson

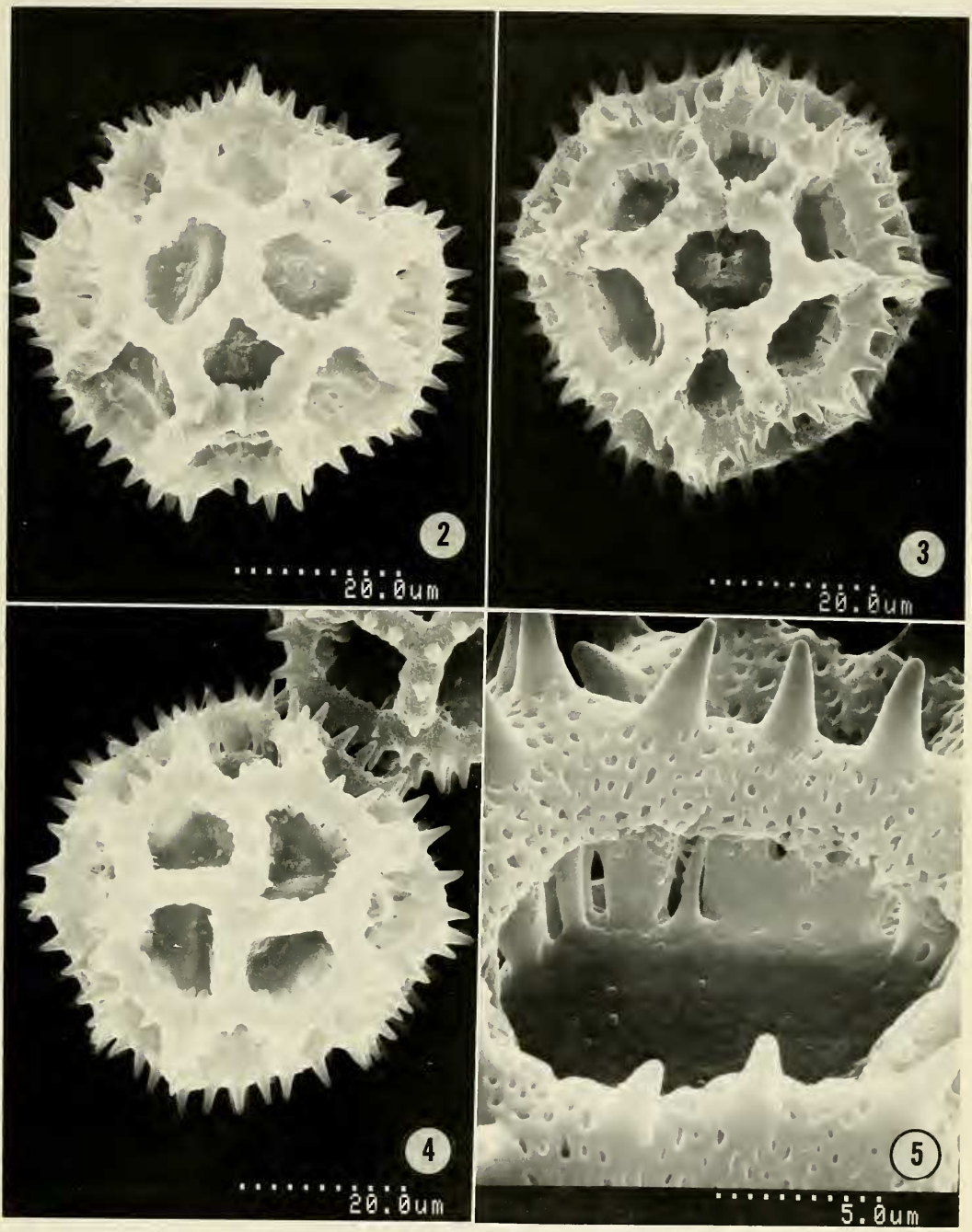
Abstract.—*Aynia pseudascaricida* is described as a new genus and species on the basis of collections from Ayacucho, Peru. The plants superficially resemble *Baccharoides* of India and Africa, but belong to the Neotropical *Lepidaploa* complex. Numerous leaf-like basal involucral bracts distinguish the genus from others of the complex. The non-rhizomatous lophate pollen is unique among the Vernonieae in having three intercolpar areolae at the poles.

Efforts to resolve the neotropical *Lepidaploa* complex of the tribe Vernonieae (Robinson 1987a, b, c) have resulted in the discovery of a totally undescribed member of the complex from southern Peru. For nearly sixty years since the collection by Killip and Smith the specimens have remained undetermined. The species has a superficial resemblance to *Baccharoides anthelmintica* of India that is sometimes cultivated as a medicinal plant, but the new genus is most easily distinguished from *Baccharoides* and from various potentially related neotropical genera by its more robust habit with larger heads (Fig. 1). The pollen is also unique in its details (Figs. 2–5). The non-type A pollen and the *Lepidaploa*-like ratio of involucral bracts clearly distinguish the genus from typical *Vernonia,* where it would be placed under older, artificial systems of classification of the tribe. The genus and species are as follows.

Aynia pseudascaricida H. Robinson, gen. et sp. nov.
(Figs. 1–5)

Plantae alte herbaceae vel suffrutescentes erectae ad 2.5 m altae laxae ramosae. Caules pallides teretes striati puberuli evanescentes, internodis ad 8 cm longis. Folia alterna, petiolis 1–2 cm longis anguste alatis; laminae late ellipticae ad 12–15 cm longae et 4–8 cm latae base breviter acuminatae margine remote mucronato-denticulatae apice supra viridis erecte puberulae parce immerse glandulo-punctatae subtus cinereo-tomentosae obscure glandulo-punctatae, nervis secundariis patentiter pinnatis utrinque 12–15. Inflorescentiae cymosae laxe lateraliter ramosae; ramis pilosulis; capitula plerumque pedunculata raro sessilia, pedunculis plerumque 3–13 cm longis. Involucrum hemisphaericum; bracteae involucri basilares foliiformes patentes elliptico-lanceolatae 2–7 cm longae et 0.5–2.0 cm latae base anguste cuneatae margine apice supra et subtus ut in foliis; bracteae ceterum fulvae rubro-tinctae appressae chartaceae subimbricatae ca. 100 in seriebus 4–5 linearilanceolatae 10–25 mm longae et base 2–3 mm latae apice peranguste acutae extus appresse puberulae et leniter pallide tomentellae ad medio distincte longitudinaliter unicostatae. Flores ca. 50 in capitulo; corollae puniceae vel lavandulae plerumque glabrae, tubis cylindricis ca. 8 mm longis, faucibus leniter infundibularibus 3–4 mm longis, lobis angustis ca. 10 mm longis et 0.8 mm latis apice dense spiculiferis in nervis incrassatis sensim sclerificatis; filamenta angusta carnosa in partibus superioribus ca. 0.65 mm longa, cellulis oblongis vel laxe oblongis vix noduliferis vel incrassatis; the-

Fig. 1. *Aynia pseudascaricida* H. Robinson, Holotype, United States National Herbarium, Washington, D.C.



Figs. 2–5. Pollen of *Aynia pseudascaricida*. 2. Polar view showing three intercolpar polar areolae. 3. Colpar view showing incomplete muri above and below pore. 4. Intercolpar view showing two tiers of two areolae. 5. Detail of pollen crest showing underlying large baculae attached to footlayer.

cae antherarum ca. 5.5 mm longae, cellulis endothecialibus suboblongis leniter asymmetrice lineate ornatis; appendices antherarum lanceolatae ca. 1.8 mm longae ad medio costatae margine leniter reflexae apice pungentes; basi stylorum distincte noduliferi; rami stylorum ca. 5.5 mm longi et abaxialiter dense hirsuti non glanduliferi. Achaenia ca. 4.5 mm longa et 1.5 mm lata superne in zonis 1 mm longis laeva et sclerificata inferne sensim 10-nervata a videtur glabra base et apice parce et minute glandulifera raro superne minute setulifera, raphidis plerumque quadratis; carpopodia ca. 0.5 mm alta et 1 mm lata ad foraminem valde incurvata, cellulis oblongis in parietibus incrassatis lateraliter porosis; setae pappi flavidae capillares rigidae ca. 75 in seriebus 2–3 longiores plerumque 13–17 mm longae apice sensim angustiores pungentes extus convexae extus et margine scabridae; setae exteriores breves paucae indistinctae ca. 0.5 mm longae squamiformes vel subulatae et base alatae. Grana pollinis in diametro ca. 60 μm lophata, cristis non rhizomataceis, areolis intercolpi aequatoriale in seriebus duplicibus binis, areolis intercolpi unicis superioribus et inferioribus ad polem attingentibus (*Aynia*-type, Figs. 2–5).

Type.—Peru: Ayacucho: Aina (Ayna), between Huanta and Rio Apurimac; alt. 750–1000 meters; open woods. Herb to 6 ft; stem simple; corolla tubes deep pink; styles white to pink; stamens deep pink. May 7, 17 1929. E. P. Killip & A. C. Smith 22514 (Holotype US). Paratype: Peru; Ayacucho: Aina, between Huanta and Río Apurimac; alt. 750–1000 meters. Thickets. Shrub 5–8 ft, with elongate branches; florets deep pink. May 7, 17 1929. E. P. Killip & A. C. Smith 23101 (US).

The generic name derives from the collection locality in northern Ayacucho in Peru. The species name derives from the resemblance to the well known *Baccharoides anthelmintica* (L.) Moench of India that is sometimes introduced into the Neotropical Region.

The ease of distinction of *Aynia* as a genus leaves the question of its closest relationship unresolved. There is no problem once certain assumptions are made. Some of the most important information that would determine the placement of the new genus in the paleotropical or neotropical members of the tribe is lacking in the present material. At present there is no information on the chemistry and chromosome number, characteristics that were found to differ in the new and old world groups (Jones 1977). Nevertheless, *Aynia* is presumed to be native to the area where it was collected, and in the absence of any characters specifically relating the genus to paleotropical genera such as *Baccharoides,* it is supposed that relationship is to the neotropical members of the *Lepidaploa* complex. Examination of details shows ample differences in *Baccharoides* such as the form of the inflorescence, the presence of appendages on the involucral bracts, the long, narrow, basal tube of the corolla rather abruptly expanding into a cylindrical throat, the lack of thickened veins and the presence of glands rather than numerous spicules at the tips of the corolla lobes, the smaller cells of the anther collar, the lack of broad appendages in the bases of the anther thecae, the transversely oblong and closely vertically striated endothecial cells, the smaller and blunter anther appendages, the lack of a node at the base of the style, and the more elongate achenes densely covered with setulae and glands. For this reason the new genus is seen as unrelated to *Baccharoides* and is regarded as a member of the Neotropical element of the tribe. The chromosome number is expected to be based on $\bar{\chi} = 17$ when it is determined, rather than $\bar{\chi} = 9$ or 10 as in paleotropical members of the tribe.

The relationship of *Aynia* within the Neotropical Vernonieae can be understood best by a review of various individual features in detail as follows under the headings, pollen, inflorescence, corolla lobes, anther, style base, pappus, and geography.

Pollen

The pollen of *Aynia* is lophate with nonrhizomatous crests attached to the footlayer by large baculae (Fig. 5). The general form occurs widely in the Vernonieae in both paleotropical genera such as *Baccharoides* and American genera such as *Stokesia, Mattfeldanthus* and *Lessingianthus.* Typical *Baccharoides* differs by having more than one row of smaller baculae under the crests, but other species of that genus have a single row of larger baculae as in the American genera. Relationship to the paleotropical and American groups cannot be determined on the basis of the pollen alone.

The pollen grains of *Aynia* are distinct from all the genera mentioned, both paleo- and neo-tropical, in the detail of the areolation. The unique form can be viewed as having intercolpar groups of six areolae (1:2:2:1) that are unique in reaching the poles of the grain (Figs. 2–4). In other pollen types with similar intercolpar groupings, the groupings are always separated from each other at the poles by colpi or extra areolae. In all other lophate grains in the Vernonieae with three areolae grouped at the poles, the areolae involved are aligned with the pores. The phyletic value of a distinct pollen form must be judged by the ease with which it can be derived from other types in related genera. In this case, the pollen is not duplicated in any other member of the Vernonieae. This is in spite of the fact that a 1:2:2:1 intercolpar pattern which does not reach the poles is one of the most common patterns in the tribe, and it is even seen in a crude form in most type A grains.

Inflorescence

The two specimens seen show an inflorescence with heads in one cymose series (Fig. 1). Most of the heads are terminal, with the remainder of the inflorescence arising laterally from the axil of a leaf-like bract. In only one of the heads is the lateral branch from immediately below the head with the head appearing sessile. In two of the seven heads observed, the head rather than the branch is axillary, and it is less mature than the head to which it is lateral. The inflorescence structure is simpler than any in *Baccharoides,* where the branch origins often lack bracts. In the regularly bracteate condition, *Aynia* is more like the Neotropical *Lepidaploa* complex. Within the latter complex, the inflorescence superficially most resembles *Lessingianthus* by its usually long-pedunculate heads.

The large, foliose, basal bracts of the head, by which *Aynia* superficially resembles typical *Baccharoides,* are obviously not evidence of close relationship to the latter genus. Still, the bracts readily distinguish *Aynia* from all members of the *Lepidaploa* complex to which *Aynia* is apparently related. The other members of the complex with foliose outer bracts have a gradual transition, and their foliose bract tips are never very large. The bracts in *Aynia* are totally leaf-like and show almost no intergradation.

The inner involucre of *Aynia* has bracts of a totally different texture from the basal series. The ratio of the inner bracts to the flowers is 2:1, a ratio characteristic of *Lepidaploa* and *Lessingianthus.* Such a ratio is widely distributed in the Neotropical Vernonieae, but it is not found in typical *Vernonia* from eastern North America.

Corolla Lobes

On the basis of an incomplete survey, the veins in the corolla lobes of the *Lepidaploa* complex seem distinct among the Vernonieae by the extent to which they fuse broadly and form an enlargement at the apex. The least amounts of fusion seen in the complex in the genus *Chrysolaena* are as strongly fused as those of any other genus examined in the tribe. In this respect *Aynia* is most clearly a member of the *Lepidaploa* complex. The veins at the tips of the corolla lobes expand into a large shield that is equalled in the complex only in the genus

Mattfeldanthus. The tracheids and fibers form a mass that makes the tip of the lobe very stiff in both *Aynia* and *Mattfeldanthus.* The type species of the latter genus, *M. mutisioides* H. Robins. & R. M. King, further resembles *Aynia* by the densely spiculiferous outer surface of the lobe-tip. *Mattfeldanthus nobilis* (H. Robins.) H. Robins. differs in having numerous small glands rather than spicules on the outer surface. The lobe character, more than any other, specifies the relationship of *Aynia* to the *Lepidaploa* complex.

Anther

The anther thecae of *Aynia* are like those of *Mattfeldanthus* and unlike those of *Baccharoides* in both basal appendages and endothecial cells. The two Neotropical genera both have broadly truncate differentiated bases on the thecae. The marginal cells are obviously specialized and form slight lobes. *Baccharoides,* in contrast, has shortly pointed anther bases with almost no differentiated marginal cells. The endothecial cells of the Neotropical genera are also alike in their curved, thickened bands that usually leave the median surfaces of the cells unthickened. In *Baccharoides* the cells are shorter and have vertical bands usually rather evenly spaced and straight across the surface.

The apical anther appendage of *Aynia* is distinct from those of all the other genera discussed by the lanceolate shape and the median costa. The appendage differs from *Baccharoides* additionally by the somewhat recurved margins and the laxer cells. The appendages of *Baccharoides* are much shorter, blunter, denser and flatter. The anther collars of *Baccharoides* are like the apical appendages in having smaller cells than in *Aynia* and *Mattfeldanthus.*

Style Base

The presence of a node at the base of the style is of some use in determining relationships in the Vernonieae. *Aynia* has a distinct node and in that way differs from the majority of paleotropical Vernonieae including *Baccharoides.* Those paleotropical Vernonieae having a stylar node such as *Distephanus* (Robinson & Kahn 1986) also tend to differ by having a much larger node. Nodes of the type seen in *Aynia* are most common in the neotropical Vernonieae and exactly the same form can be found in *Mattfeldanthus.* It is notable that distinct nodes are lacking in the other genus of the *Lepidaploa* complex having non-rhizomatous pollen, *Lessingianthus.* Thus, the stylar node, like the corolla lobes, places *Aynia* closer to *Mattfeldanthus,* which differs in inflorescence form and corolla symmetry; and it tends to separate *Aynia* from *Lessingianthus,* which it resembles more in the latter two characters.

Pappus

The pappus of *Aynia* looks different from that of related genera in color and persistence, but the actual character differences are more subtle. The comparative persistence seems related to the presence of more rows of bristles. The color difference is, at least partly, due to the thicker bristles. The bristles are convex and scabrid on the outer surface. In contrast, the bristles of *Mattfeldanthus* are flattened and smooth on the outer surface, and the bristles of *Baccharoides* are flattened and scabrid. A well-marked outer pappus series is not so obvious in *Aynia* as in most Vernonieae including *Mattfeldanthus*; however, some shorter outer papper segments are present. They are of various lengths and a few have broadened alariform bases with shortly awned tips. The form of the pappus is not unique within the Vernonieae, but it seems unique within the *Lepidaploa* complex.

Geography

The occurrence of *Aynia* in the Andes is a prime reason for relating the genus to oth-

er neotropical Vernonieae rather than to paleotropical genera such as *Baccharoides* which has superficially similar basal involucral bracts. All details of structure appear to reenforce the geographical evidence, and there is no reason to doubt that *Aynia* is related to the neotropical Vernonieae with which it occurs. Nevertheless, the geography does not correlate perfectly with the genera to which the new genus is evidently most closely related. *Lepidaploa,* which is common in the Andes, belongs to a more specialized element of the *Lepidaploa* complex that has rhizomatous crests on the pollen. The two other genera of the complex that have non-rhizomatous pollen are concentrated in Brazil. Both species of *Mattfeldanthus* are presently known only from Bahia in Brazil. *Lessingianthus,* which occurs in Peru, is represented there only by species extending their ranges from farther east. The geography seems to reenforce the distinct nature of *Aynia* in the *Lepidaploa* complex, with the new genus being the only element with non-rhizomatous pollen crests that is not centered in Brazil.

Acknowledgments

The pollen specimens were prepared by Barbara Eastwood using facilities of the Botany Department Palynological Laboratory. The photographs were prepared by Brian Kahn of the Smithsonian Museum of Natural History SEM Laboratory using a Hitachi 570 scanning electron microscope. The photograph of the holotype was made by Victor E. Krantz, Staff Photographer, Museum of Natural History.

Literature Cited

Jones, S. 1977. Vernonieae: Systematic review. Pp. 503–521 *in* V. H. Heywood, J. B. Harborne, & B. L. Turner, eds., The biology and chemistry of the Compositae, chapter 17, Academic Press, New York.

Robinson, H. 1987a. Studies in the *Lepidaploa* complex (Vernonieae: Asteraceae). I. The genus *Stenocephalum* Sch. Bip.—Proceedings of the Biological Society of Washington 100:578–583.

———. 1987b. Studies in the *Lepidaploa* complex (Vernonieae: Asteraceae). II. A new genus, *Echinocoryne.*—Proceedings of the Biological Society of Washington 100:584–589.

———. 1987c. Studies in the *Lepidaploa* complex (Vernonieae: Asteraceae). III. Two new genera, *Cyrtocymura* and *Eirmocephala.*—Proceedings of the Biological Society of Washington 100: 844–855.

Robinson, H., & B. Kahn. 1986. Trinervate leaves, yellow flowers, tailed anthers, and pollen variation in *Distephanus* Cassini (Vernonieae: Asteraceae).—Proceedings of the Biological Society of Washington 99:493–501.

Department of Botany, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.